



**MASTERS PROGRAMMES:
ENGINEERING MANAGEMENT
PROJECT MANAGEMENT
TECHNOLOGY AND INNOVATION MANAGEMENT
PROGRAMME GUIDE FOR 2018**

**GRADUATE SCHOOL OF TECHNOLOGY MANAGEMENT
UNIVERSITY OF PRETORIA**

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FOREWORD

This document contains information about the MEM, MPM and MTIM postgraduate Programmes offered by the Graduate School of Technology Management (GSTM) of the University of Pretoria. Please note that prospective candidates need to apply for admission to any particular programme - closing dates for applications are provided in this brochure. Application material is provided separately. Enquiries may be directed to –

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This information brochure should be read in conjunction with the applicable *General Regulations as well as the year book of the University of Pretoria, Faculty of Engineering, Built Environment and Information Technology*, which contains all the current regulations and syllabi. The requirements of the Yearbook will apply irrespective of the information contained in this brochure. Although every attempt has been made to ensure that this brochure is correct and up to date at time of publishing, the Graduate School of Technology Management reserves the right to make any changes without prior notice and without prejudice.

TABLE OF CONTENTS

1. INTRODUCTION.....	1
2. ENGINEERING-/PROJECT-/TECHNOLOGY and INNOVATION MANAGEMENT	1
3. HISTORY AND ORIGIN OF PROGRAMMES.....	2
4. PROGRAMME MANAGEMENT MODEL AND PERSONNEL	3
5. ADMISSION PROCESS	3
5.1. Admission and Selection.....	3
5.2. Qualifications Awarded	4
5.3. Admission Criteria	4
5.4. Application and Closing Date	4
5.5. Registration and Orientation Day	4
5.6. Registration and Student Card	5
6. FINANCIAL INFORMATION	5
6.1. Programme Fees.....	5
6.2. Bursaries and Loans	5
6.3. Student Finances	5
7. LEARNING PROCESS AND SYSTEM	6
7.1. GSTM Student Resources.....	6
7.2. English Proficiency	6
7.3. Learning Model.....	6
7.4. Study groups and teamwork.....	6
7.5. Personal Development and Teambuilding Programme	7
7.6. Class Leader and committee	7
7.7. Class Attendance.....	8
7.8. Typical class contact day, evenings and weekends	8
7.9. Tea and Lunch Breaks	8
7.10. Distance Support.....	8
7.11. Self-study and Preparation	8
7.12. Pre-requisite modules.....	9
8. ASSESSMENT PROCESS.....	9
8.1. Assessment Policy and Marks	9
8.2. Examination days.....	9
8.3. What if you fail a Module?	10
8.4. In case of Sickness or Accident	10
8.5. Distance Examinations.....	10
8.6. Assignments and back-ups.....	10
8.7. Code of Honour.....	11
9. MEM PROGRAMME ARCHITECTURE	11
9.1. MEM Programme Objectives	11
9.2. Required Outcomes of Modules of MEM Programme.....	11
9.3. Programme Architecture, including domains	11
10. MPM PROGRAMME ARCHITECTURE	12
10.1. MPM Programme Objectives	12
10.2. Required Outcomes of Modules of MPM Programme	12
10.3. Programme Architecture, including domains	12
11. MTIM PROGRAMME ARCHITECTURE.....	13
11.1 MTIM Programme Objectives	13
11.2 Required Outcomes of Modules of MPM Programme	13
11.3 Programme Architecture	13

12. PROGRAMME SCHEDULE	13
13. DESCRIPTION OF MEM and MPM MODULES	14
14. DESCRIPTION OF MTIM MODULES	22
15. GENERAL INFORMATION	25
15.1. Location of Offices	25
15.2. Lecture and Syndicate Rooms	25
15.3. Parking and Property.....	25
15.4. Cell Phones and Messages	25
15.5. Personal information.....	25
15.6. University and Faculty Regulations.....	25
15.7. Alumni Affairs	26

1. INTRODUCTION

Welcome to the University of Pretoria and in particular to the *Masters Programme in Engineering Management (MEM)*, *Masters Programme in Project Management (MPM)* and *Masters Programme in Technology and Innovation Management (MTIM)*. We are looking forward to meeting you all and working with you during the next two years. This document contains important information concerning the masters' programmes. Please read it carefully and contact us if there is anything that you do not understand – it may just save you considerable time and effort later on.

The purpose of this programme guide is to provide information mainly to prospective students, but it is applicable to and should also be useful to current students. Please note that this programme guide has been prepared well before the commencement of the new academic year and that some information is subject to confirmation (e.g. programme schedules and fees).

2. ENGINEERING-/PROJECT-/TECHNOLOGY and INNOVATION MANAGEMENT

The purpose of these programmes is to provide management education for the practising engineer, project manager and technologist, irrespective of undergraduate discipline. These postgraduate management programmes are sought-after and address an important and growing need in business and industry. Whereas the traditional engineering disciplines focus mainly on technology itself, these programmes focus on the utilisation of technology (and other resources) in the business environment for the creation of wealth at project, enterprise and national level.

The need for postgraduate education in engineering and technology management arises from two primary considerations, namely the classic approach to undergraduate education and the requirements of industry. The classic approach educates engineers in a specific engineering discipline such as electronic, mechanical, civil, industrial or computer engineering. The result is that the graduate engineer enters his/her practical career primarily as a specialist. Considering the vast scope and content of the various disciplines, as well as the maturity of the average undergraduate student, it is not feasible to devote attention to the "engineering process" or "management issues" at undergraduate level. Within typically the first 3 to 6 years of the engineer's career he/she will *become increasingly involved in the management of the process* by which engineering systems, products and services are created, utilised, and maintained. This requires the management of projects and related resources such as technical and personnel, the management of funds and facilities, and the cost-effective integration of the contributions of more than one person and more than one discipline. This calls for skills and knowledge the engineer has not been trained for.

Historically, engineers in South Africa have been primarily involved in the operation and maintenance of engineering equipment and systems. With the exception of civil and mining engineering, a significant portion of design and development work were contracted in from abroad and operated locally to achieve some economic benefit. Over the last decades, however, the need for local design and development has also arisen in the petro-chemical, defence, telecommunication and other technology-based business sectors. Local capabilities to establish a technology base have become increasingly important and are now vital to the growth of the economy and international competitiveness. An in-depth understanding of the total life-cycle as well as the application of resources in this context is required for a career in the management of engineering and technology.

Engineering Management, Project Management and Technology and Innovation Management are global evolving disciplines. The increasing complexity of engineering systems and activities,

the scope and sophistication of resources as well as advances in technology have all been driving forces in the evolution of this new field.

Resources at the disposal of the engineering, project and technology manager are typically technology, people, money, facilities, equipment, and information. All of these resources are vitally important to the manager in achieving business objectives in practice. Of specific importance, however, is technology, a resource fulfilling a central role in the engineering environment. The *life-cycle processes of engineering systems* and products can be described as follows: design and development, production or construction, operation, support, maintenance and phase-out.

The availability of resources and knowledge of the life-cycle processes are not sufficient to create something useful - it is necessary to synthesise these two dimensions: resources must be applied in the context of the processes in order to create products or services. Synthesisers fulfil this role in the engineering space. Important *integrating management functions* like strategic management, project management and system engineering are addressed as well as *conceptual tools* like risk management, quality and decision analysis.

In order to gain insight into a system it must be viewed in the *context of its environment*. The (high-tech) enterprise, within which Engineering, Project and Technology Management are applied, is such a system where the environment has a significant impact on system performance. The environment can be classified as economic, legislative, technological, industrial, socio-political, and natural.

It is important to understand that engineering, project and technology management supplement and enrich the technical training of the engineer or scientist, not replacing it.

3. HISTORY AND ORIGIN OF PROGRAMMES

A Chair for Engineering Management was established at the University of Pretoria in 1987. The Chair developed a *Master's Programme in Engineering Management (MEM)* and the first group of 45 students was admitted in 1989. Since then, between 40 and 50 practising engineers from across the industry spectrum registered for the Programme every year. Building on the success of the start-up years, a formal separate department, the *Department of Engineering and Technology Management* was established in 1994 in the then Faculty of Engineering, the one and only of its kind in South Africa. Today the Department of Engineering and Technology Management offers a variety of engineering, technology and project management related programmes. Knowledgeable and experienced individuals from industry are also involved on a part-time basis, often as "extraordinary professors".

A *Masters Programme in Project Management (MPM)* was established in 1999 and initially 45 students were admitted. This programme is based on the same format of presentation as the MEM, but the emphasis is on Project Management in technology-based enterprises. However, project management principles can be applied in any type of organisation. Most work in modern organisations is executed by multi-disciplinary teams led by project managers, hence the popularity of this programme.

In 2004, a *Master's in Technology Management (MTM)* with four modules and a Mini-dissertation was introduced. This degree was aimed at graduates with an Honours in Technology Management degree to further prepare them for leadership roles in business through professional postgraduate education.

In 2018 the MTM was restructured and a *Master's in Technology and innovation Management (MTIM)* with twelve modules and a Mini-dissertation was introduced. In this Masters programme, you will be introduced to the basics and innovation management, technology management, human resource development and strategic management, all of which support the long term goals of building levels of innovation and productivity within an organisation.

Since the year 2000 the *Graduate School of Management*, in close co-operation with the Department, managed the MEM and MPM programmes. Due to the multi-disciplinary nature of the programmes, the programmes were managed by the GSM to optimally integrate other important disciplines such as human resources, financial, marketing and information management. The GSM also maintained close ties with the Faculty of Economic and Management Sciences. However the academic home of the programmes remained the Department of Engineering and Technology Management.

Significant growth of these types of programme is expected in South Africa and abroad during the coming years. International standards and recognition become more important as UP becomes part of global research and education. Additional focus, resources and research were required. Consequently, the *Graduate School of Technology Management (GSTM)* was established in 2007 to offer the management programmes. The initial core of the GSTM comprised the Department of E&T Management and personnel from the GSM. Additional capabilities are envisaged. The GSTM is strategically positioned in the Faculty of Engineering, Build Environment and IT (EBIT). The integration of research, teaching, programme design and delivery as well as industry contact, proved to be successful.

4. PROGRAMME MANAGEMENT MODEL AND PERSONNEL

These programmes are managed as distinct programmes by the Programme Director and supporting staff of the GSTM. The objective is to maintain a focussed programme view and to utilise scarce resources (e.g. lecturers) optimally. The *Programme Director* of the programmes is *Dr Siebert Benade* and the *Programmes Office Manager* is *Marlene Mulder*. The *Programme Administrator* for the MEM and MPM programmes is *Tanya van Zyl* and *Hellen Kriek* is the Programme Administrator for the MTIM Programme. The academic/intellectual content and quality resides within the GSTM. The *Chairperson of the GSTM* is *Prof Elma van der Lingen*. *Dr SJ Benade*, *Dr Giel Bekker* and *Prof Tinus Pretorius* are the academic advisors for the *MEM*, *MPM* and *MTIM* programmes respectively. About 60% of lecturers on the programmes are from the GSTM. Due to the multi-disciplinary nature of the Programmes, lecturers from other faculties in the University and from industry also present modules, depending on where the required expertise is available. In particular, some of the first-year modules are presented by lecturers from the Faculty of Economic and Management Sciences. Although they are exclusively presented to the MEM, MPM and MTIM groups, these modules remain the responsibility of the source department. This responsibility includes all operational aspects, such as module design, delivery and assessment, etc. In essence, the "deliverable" to the programme is the list of final marks for the class.

5. ADMISSION PROCESS

5.1. Admission and Selection

Admission is competitive and a selection committee carefully selects candidates with the highest potential. A fair and unprejudiced selection process is strived for. All applications for admission to the Programmes are subject to a selection based on academic achievement, relevant

experience, and objectives for career development. For this purpose applicants must also submit a full academic record (subjects, marks, time frame for completion) as well as a letter of recommendation from his/her employer. Selection may include a personal interview.

5.2. Qualifications Awarded

Two types of qualification can be awarded: MEng (Engineering Management, or Project Management or Technology and Innovation Management) or MSc (Engineering Management, Project Management or Technology and Innovation Management) depending on undergraduate study. The course structure and duration are nominally the same for both degrees.

5.3. Admission Criteria

Required Qualification: Candidates for the MEng (Engineering Management, Project Management or Technology and Innovation Management) must be in possession of a four-year bachelor's degree in engineering from a recognised university. Candidates for the MSc degree must be in possession of a BSc honours degree in a suitable scientific field. Candidates following the BTech route should also have an appropriate BSc honours degree or MTech to be considered for the MSc programme.

Only applicants with a minimum average of 60% (calculated on the grades of all the final year modules (failed/passed) for the pre-requisite degree) will be considered for admission to the MSc (Engineering Management, Project Management or Technology and Innovation Management) degree.

Required Experience: All candidates should have at least 3 years relevant post-degree working experience, preferably more. Exceptional academic achievement (e.g. distinction for degree) could allow applicants on the programme with only two years working experience. This however is the exception not the rule. Granting this exception will be the decision of the selection committee and is not guaranteed.

Compliance to the criteria does not guarantee admission.

5.4. Application and Closing Date

Application material can be obtained from the programme administration at the GSTM. Application for admission to the programmes should be made on the appropriate forms and submitted to the Programme Administrator.

The closing date for applications for a specific year is typically the last week in **October**, of the previous year.

5.5. Registration and Orientation Day

Registration

Students will register online on the UP portal. Website: www.up.ac.za and click on My Tuks login.

Orientation day

This event is only for *first year* students. Attendance of this event is *compulsory*. Programme orientation, meeting with academic personnel, "ClickUP" training (e-learning) and access, issue of all study material, etc. are important activities to kick-off the first academic year.

Second year students do *not* come to campus for registration. Register online on the UP portal. Website: www.up.ac.za and click on My Tuks login.

5.6. Registration and Student Card

After registration you will be able to print a proof of registration on the UP portal. You need to present your proof of registration at the Client Service Centre (CSC) on campus (at some convenient time) to have your student card issued. You could do that during your first study block. You will need your student card to enter the campus and access the library. It is essentially your campus ID and you should have it with you at all times when on campus.

6. FINANCIAL INFORMATION

6.1. Programme Fees

The total fee for the masters programmes for 2018 is approximately R116 000. These fees apply to students completing the programme within the prescribed two-year period. The fees are typically payable as follows: 60% in the first year, and 40% in the second year. If necessary to register for a third year (*maximum*), a re-registration fee of approximately R 7500.00 will be payable per year. Where necessary, arrangements can be made to pay each year's portion in two equal instalments. Students who do not have South-African citizenship are liable for an additional ±R2 700.00 per annum administration fee.

Distance examinations are arranged for students who apply, but at an extra cost of R600 per examination paper within the RSA and SADC countries and R1300 per examination paper for international countries. Examination fees are reviewed annually, and could thus be higher in 2018. Fees will be finalised towards the end of the year, typically during November. Although every effort is made to keep the total fee fixed for students entering in a particular year, the University reserves the right to increase fees. This may particularly be necessary when the exchange rate affects the price of textbooks.

6.2. Bursaries and Loans

A limited number of bursaries are awarded annually to deserving candidates. The criteria include a means test, the student's potential and past academic performance. Continuation of financial support is subject to satisfactory performance. Information can be obtained at "Bursaries and Loans" at the Client Service Centre (CSC) (012 420 3111), *not* from the programme management team.

6.3. Student Finances

Please contact student accounts for any queries with regard to your account.

Contact detail:

Mr Frans Mothogoane
E-mail: frans.mothogoane@up.ac.za
Tel Nr: +27 12 420 5115

Mr Ayanda Simelane (Head of Student Accounts)
E-mail: ayanda.simelane@up.ac.za
Tel Nr: +27 12 420 6393

7. LEARNING PROCESS AND SYSTEM

7.1. GSTM Student Resources

The GSTM Student Resources website (www.up.ac.za/gstm/student) contains all the programme documents, e.g. Timetable, assignment cover pages, guidelines for written assignments, etc. Make sure you visit the website.

7.2. English Proficiency

The medium of instruction and communication of the programme is **English**. It is hence essential that applicants can properly write, read and express themselves in English. Candidates may submit assignments and the project report in Afrikaans, if they so wish. A TOEFL or IELTS test may be required of candidates who have not studied the prerequisite degree through the medium of English.

7.3. Learning Model

The programme is delivered as a **closed programme** for “technical professionals” to enhance group activity, personal development and a higher level of intellectual interaction. It is recognised that effective learning depends largely on group activity and the intellectual level and maturity of the participants. It is hence required from participants to actively take part in class and group interaction.

Participants are typically professionals, entrepreneurs and (project/technical) managers in the age group of 27-43 years and fully active in their careers. Hence, available time for class attendance is limited. Student/lecturer contact is however considered to be crucial. In view of the above, candidates are expected to **free themselves completely** from other duties **during class contact**. Candidates may be expected to work in the evenings and over weekends during study blocks.

The programme is structured around modules presented over a period of two years: two modules, of two contact weeks each, per year typically during **February** and **August**. It is **compulsory** to attend the **study blocks**. A web-based distance support system is used to create a virtual classroom. For this reason, all students are required to have access to the Internet through a suitable browser and be able to take part in discussions using the Internet. Lecturers facilitate distance learning (group and individual activities) throughout each academic cycle. It is expected from participants to come to contact sessions fully prepared. Pre-assignments are required for most modules. Student/lecturer interaction is consequently on a higher intellectual level where concepts and the application of theory are discussed. Assignments are done during and after the class contact sessions. Group interaction as an integral part of learning and personal development is emphasised. Lecturers furthermore facilitate the learning process to enhance group activity. A **balance** between **theory** and **practice, individual** and **group activity**, class **contact** and **distance** education is hence strived for.

Although a single lecturer is appointed to accept responsibility for a given module, a selection of guest lecturers can also be employed.

7.4. Study groups and teamwork

Group allocations will be made prior to registration/orientation day – details to be announced during the morning’s proceedings. Some form of group work will be required to be completed prior to commencement of the study blocks. The groups will typically have 5 to 7 members. Since all of you must have **access to the Internet**, geographic location should not be a problem – you will not be grouped on a geographical or company basis. You are not permitted to make any

changes to the group allocations without discussing it with the responsible lecturer. The programme administrator should be informed about any changes in study groups. Bear in mind that a ***great deal of the course value is derived from the interaction you have with fellow students*** from other companies. Groups will be formed to be as diverse as possible. This interaction is often challenging; try to learn from one another!

If a group member does not make an ***acceptable contribution*** the group/group leader or class leader should ***seriously discuss the matter*** with the specific member to get him/her ***on track again***. If this unacceptable/no inputs to group work continues, the group can allocate a percentage to the specific member when handing in the group assignment. 0% contribution means the mark of the specific member will be 0% of the final mark for the group assignment; meaning 0%. The same goes for e.g. 50% or 75%. The purpose however remains ***open*** and ***honest discussion*** within the group to include and motivate all group members to ***successfully participate in group assignments***. Only in the final instance the Programme Director will intervene to try to resolve study-group issues.

7.5. Personal Development and Teambuilding Programme

The development of you as a ***person*** and a ***manager*** is a key aspect of these programmes. Class presentations and final year symposium, e.g. provide opportunities to improve self-confidence and public speaking. Within study groups, team spirit develops and group assignments are done. Study-group activities enhance interpersonal and communication skills and significantly enrich the learning experience. The People Management (academic) module is also essential in this regard.

A teambuilding programme was specifically developed for these programmes. Participation is ***compulsory*** and will be ***formally evaluated***. You should ***complete your HBDI profile on-line*** using the link supplied. The teambuilding programme comprises three phases:

Phase 1 is a day of socialising, fun and getting to know one another. You will also meet your ***study-group*** members. During this event a ***class leader*** for each class is elected. This event is typically scheduled for the ***Saturday after your Orientation day in January***. MEM/MTIM and MPM students have their own event on different Saturdays.

Phase 2 is about a better understanding of your-self. Your individual HBDI profile will also be discussed. It is essential to communicate efficiently and to start working as a team, specifically to do your group assignments. Phase 2 is scheduled in the ***first semester for the Saturday before your study block commences on the Monday***. Refreshments will be provided.

Phase 3 focuses on whole-brain problem solving, decision making and some career advice. The formation and management of teams will be addressed. Activities are scheduled in the ***first year, second semester, during the study block from 15h00 to 20h30*** on a specific, pre-determined day for each study group. Details will be communicated with you well in advance.

7.6. Class Leader and committee

A class leader (representative) is elected for each programme intake on the first teambuilding day. ***Communication, team spirit*** and ***effective functioning of study groups*** should be the primary focus of the class leader. The representative will be responsible to act on behalf of the class and serve as liaison with the programme management team for the rest of the year (you can elect somebody else for the following year). The Programme Administrator will communicate with the class leader regarding any important administrative issues concerning the class. Class leaders can contact the Programme Director to discuss any programme-related matters. Any problem that you would like to bring to our attention should also be communicated via the class

representative. A single channel of communication will avoid misunderstandings and loss of information. You can decide on your own how you should go about electing this person. The group can decide whether they want to elect a committee to support the representative. Problems should be discussed in the group/committee first before it is presented to the programme management team.

7.7. Class Attendance

Class attendance during study blocks is *compulsory* and *important*. If, for some unforeseen reason, you will be absent from a lecture for a few hours, you must obtain the lecturer's permission beforehand. This will not necessarily be granted. If you cannot attend a study block, please inform the Programme Administrator to *deregister* you for the particular module. The onus is on you to register the next year to *repeat* the module. Please do not request permission from the Programme Director to be excused from a study block!

7.8. Typical class contact day, evenings and weekends

A typical class contact day starts at 08h00 to 17h00. On *Wednesdays* at lunchtime a module is typically concluded. The next module will commence at *13h00* after lunch. You can be expected *to be available at short notice* to attend guest lectures and/or do group work or self-study during the evenings or weekends of the study blocks; hence keep this time open for academic or teambuilding activities.

7.9. Tea and Lunch Breaks

Early-morning coffee at 07h30, mid-morning tea at 10h00 and afternoon tea at 15h00 will be served at the Graduate Centre on the scheduled lecture days. Individual lecturers will arrange the duration of tea breaks with you. Typically 15 minutes. Lunch will be available from 12h00-13h00 at Adler Restaurant situated adjacent to the Graduate Centre (southern side).

7.10. Distance Support

Distance support for the programmes is provided via the internet. Each module has a separate "web page" and provides module content, proposed study schedule, assignments, communication tools and download facilities. The study guide for each module can also be downloaded and printed. You will receive a manual on the use of ClickUP (e-learning system) as part of your registration documents. As soon as you are registered, you will have access to Student online services (ClickUP) at www.up.ac.za (click on current students/portal log-in). If you do not have a password, log on with your student number (e.g s14552536) and your ID number. If you experience any technical or password problems, please phone (012) 420 3837 or email studenthelp@it.up.ac.za (please state your student number in the e-mail). You need to access ClickUP **before** the first classes, as you need to prepare **before** the first classes.

7.11. Self-study and Preparation

Graduate study differs from undergraduate study in a number of ways. One important difference is the amount and level of self-study required. It is important that you realise this and *plan for a substantial amount of work at home* in order to master the module material. The web-based support has been specifically introduced to assist you in this regard – make use of it. Make sure you check your mail (in ClickUP) and the discussion space regularly (*at least once a week*) and respond when required. Take part in group and class discussions. The contact time is not sufficient to internalise and digest everything. Rather, this time will be used to highlight important areas, obtain feedback from the class, have group discussions and presentations, and

also have lectures on specific areas. You are encouraged to read wider than the material provided and make use of the library.

Create your own project plan for each semester with important events, deliverables and dates. Organise yourself accordingly.

Please make sure that you are aware of any ***preparation*** required for a module before the study block, so that you come to class ***fully prepared***.

7.12. Pre-requisite modules

The required ***logic*** and ***sequence*** of modules are built into the programme and domains. The best “route” to follow is defined in the Programme Architecture and schedule for each specific Programme and selected domain. When a student fails or cancels a module, he/she can carry on and do the remainder of the modules scheduled for the semester/year. However, students should not switch modules around unnecessarily. For the Construction Management Domain, the three domain modules (KBS 802, 803 and 804 must be taken in this sequence. You cannot just register for KBS 804 because you are interested in the topics; it forms an integral part of a domain.

8. ASSESSMENT PROCESS

8.1. Assessment Policy and Marks

Students are assessed in a number of ways. Preparation and participation in class is important. Class presentations and group tasks during study blocks will be evaluated. Individual and group tasks during the semesters also contribute towards a semester mark. The semester mark and the final examination will typically have equal weight to constitute the final mark.

The final pass mark for all modules is 50%. You require a ***sub-minimum of 40%*** for your semester mark in order to ***qualify to write the exam***. The sub-minimum for the examination is also 40%. There may also be sub-minima for different sections of a module.

Final examination will typically take the form of a 3-hour written examination. There is no programme policy as to exactly how each module will be assessed. In all cases, there will be assignments plus a final examination. This depends on the nature of the module. Often there will also be a component of class contribution. However, the ***grading policy for each module is clearly defined in the study guide on ClickUP***. Please read it carefully.

In addition to the final marks for each module being posted on the University’s web page each individual lecturer will publish interim semester marks on ***ClickUP***. The UP Portal should be used to access this information. You will ***receive training (including an instruction)*** on how to access the portal and ClickUP. No marks will be given by telephone. Individual lecturers can give further details as to the availability of marks for their particular module.

8.2. Examination days

All final examinations will typically take place on ***Fridays, from 09h00 to 12h00***. No notebook or laptop computer is allowed during exams. Exams will typically be open book (consult your study guide). You should bring along ***all*** the material you want to consult.

8.3. What if you fail a Module?

No re-evaluations are allowed on post-graduate level. This means that if you fail a module you will have to *repeat the total module* the next year. You may *repeat a module* only *once*. If you fail a module it is your responsibility to register for it again the following year. Make sure that the module you repeat *does not clash* with a second-year module in terms of class contact or exam. You must complete first-year modules first. The onus is on the student to make sure there will be no clashes. If you register for a module but then decide not to do it, you should make sure that you request the programme administrator (by e-mail) to de-register the module at least *two weeks* before the examination of that particular module. If not, you will automatically earn a fail mark and forfeit one of your chances to pass it.

Also note that there is a *time limit* on the completion of the Programme. You will need special permission from the Dean of the EBIT Faculty and a valid reason to complete your degree over a period *longer* than *three years*.

8.4. In case of Sickness or Accident

In the unfortunate situation of sickness or an accident you should inform the programme administrator that you cannot write the examination. You should contact the Dean's Office (Ms Dawn Taljaard –dawn.taljaard@up.ac.za), head of academic administration), to apply for a sick exam. This may or may not be approved.

8.5. Distance Examinations

Students who do not reside within a **200-km** radius from Pretoria may apply to write distance examinations. The policy and procedure as well as application form for distance examination will be handed out early during each study block period and should be completed and returned to the programme administrator before the end of the first block week. Distance examinations will not be arranged without an application handed in on time.

PREREQUISITES:

- Students do not automatically qualify for distance examination.
- We will attempt as far as possible to arrange your examination at your requested venue but alternative venues might be arranged. You will be notified.
- Students within a 200 km radius of Pretoria do **not** qualify for distant examination. Students may however apply to write in Emalahleni (Witbank).

FEE:

Students wishing to write their exams outside of Pretoria have to pay an *additional fee* per paper. Refer to Programme Fees for details. Examination fees are reviewed annually, and could thus be higher the next year. Forms to apply for distance examination will be handed out in the various classes. Contact your programme administrator if you are not sure.

8.6. Assignments and back-ups

Most courses will require you to submit one or more assignments. In *most cases* lecturers will require you to submit assignments via the *ClickUP assignment tool*. Read your study guide to determine the mode of assignment submission. If you are not certain, confirm with the lecturer. You should always keep *electronic backups* of *assignments* at least until the semester is concluded and *all marks* have been finalised and published.

If an extension is granted you must submit the late assignment directly to the lecturer. You will probably be penalised and marks subtracted to be fair towards other students who submit on time.

Under no circumstances may you submit an assignment by fax.

Note that where assignments are part of the final examination they will not be returned to you. You are however welcome to inspect your assignment by prior arrangement with the lecturer after it has been graded.

8.7. Code of Honour

Although we encourage group work to facilitate the exploration and understanding of module material, in the final instance you also have to earn an individual mark for each module. This means that *the work you submit on an individual basis must in fact be your own.* To simply “copy and paste” from Websites or other material is not acceptable unless you quote a writer. Make sure that you distinguish between group assignments and individual assignments, and act accordingly. Refer also to the GSTM Student Resources web page regarding plagiarism. Turn-it-in (a web-based plagiarism detection service) is used to detect possible plagiarism.

9. MEM PROGRAMME ARCHITECTURE

9.1. MEM Programme Objectives

The purpose of the MEM programme is to provide management education for the practising engineer, irrespective of undergraduate discipline. It is aimed at the engineer pursuing a career in general management or functional management. While the traditional engineering discipline focus is mainly on technology itself, the programme is dedicated to the utilisation of technology within the engineering process in the business environment (industry) for the creation of wealth. Career development needs of engineers are addressed after obtaining a bachelor’s degree and a number of years of working experience. Some key programme objectives are subsequently listed:

- A strategic understanding of the technologically-orientated enterprise as a coherent business system.
- An in-depth understanding of the core business processes and their interaction within an organisation with the emphasis on technological / engineering processes.
- Understand the environment within which the enterprise must function, excel and survive.
- Capability to identify, acquire and manage company resources: people, money, technology, infrastructure and information.
- Life-cycle approach towards the realisation of a system or business solution in terms of system development, production, utilisation and support.

9.2. Required Outcomes of Modules of MEM Programme

Refer to Module study guides on ClickUP for detail.

9.3. Programme Architecture, including domains

The programme includes a number of focus areas or domains. A Domain could be industry-specific, e.g. "process industry or vehicle manufacturing industry". Domains could also be discipline specific, e.g. "Asset and Maintenance Management" focussing on the acquisition, operation and maintenance of capital intensive, complex infrastructure. The first year is common and is hence shared between the general MEM and other domains. In the second year a choice is

made between a number of domains. MEM comprises *12 modules* and a *research project*. The student earns *10 credits* for *each module* successfully completed, and *60 credits* are earned for the *research project*. The research project must be relevant and is undertaken under the guidance of an adviser. Students with an *Engineering degree* register for the research project using *IGB898*. Students with a *BSc Honours or BTech plus Honours degree* register for the research project using *ISC898*. A candidate qualifies for the appropriate qualification after obtaining 180 credits. Domain modules are shared with MPM students as well. The actual offering of any elective/domain will be dependent on the registration of at least 10 students.

The programme design (list of courses and domains, etc.) is available to students on the *GSTM Student Resources web page*.

The University of Pretoria reserves the right to change programmes, modules, domains and credits without prior notice. However, once a student has registered for a specific programme and paid the required fees, a *learning agreement* is established which both parties (the UP and the student) must adhere to. Required changes will be negotiated in advance.

10. MPM PROGRAMME ARCHITECTURE

10.1. MPM Programme Objectives

Projects and the effective management thereof form the basis of any growing economy. Developing countries need the effective management of industrial and infrastructure projects even more than developed economies do.

The purpose of the MPM programme is to provide project management education to the practising technical professional/engineer/project manager, irrespective of undergraduate discipline. Internationally Project Management (PM) has become the fastest growing form of management. PM is widely hailed as the “linchpin of organisational success” and the “number 1 career choice”. One of the reasons being that the tools, techniques and paradigms unique to PM have the capacity to deal effectively with rapid, radical change resulting from fierce international competition and advances in technology.

Project managers are generalists that are exposed to all aspects of the organisation. This exposure also prepares them for positions as general managers. However the focus of the programme is on project management in technology-based enterprises. An in-depth understanding of the enterprise is emphasised as well as the life cycle of a project or system. The objective of MPM is hence to provide high-quality PM education in line with international standards and best practices.

Although PM has its roots in engineering, postgraduate PM education for engineers and scientists in South Africa has been lacking prior to the introduction of this programme.

10.2. Required Outcomes of Modules of MPM Programme

Refer to Module Study guides on ClickUP for detail.

10.3. Programme Architecture, including domains

The programme includes a number of focus areas or domains. A Domain could be industry-specific, e.g. "process industry or vehicle manufacturing industry". Domains could also be discipline specific, e.g. "Asset and Maintenance Management" focussing on the acquisition,

operation and maintenance of capital intensive, complex infrastructure. The first year is common and is hence shared between the general MPM and other domains. In the second year a choice is made between a number of domains. MPM comprises **12 modules and a research project**. The student earns **10 credits** for **each module** successfully completed, and **60 credits** are earned for the **research project**. The research project must be relevant and is undertaken under the guidance of an adviser. Students with an **Engineering degree** register for the research project using **IGB898**. Students with a **BSc Honours or BTech plus Honours degree** register for the research project using **ISC898**. A candidate qualifies for the appropriate qualification after obtaining 180 credits. Domain modules are shared with MEM students as well. The actual offering of any elective/domain will be dependent on the registration of at least 10 students.

The programme design (list of courses and domains, etc.) is available to students on the **GSTM Student Resources web page**.

11. MTIM PROGRAMME ARCHITECTURE

11.1 MTIM Programme Objectives

The programme aims to provide knowledge on how to identify the technology transfer and absorption processes, how to manage these processes, how to support firm-level innovation with in-house research and development, how to engage on open or inclusive innovation, how to use big data to support innovation processes and how to maximise the acquisition of new technology within the normal constraints of financial and human resources.

11.2 Required Outcomes of Modules of MPM Programme

Refer to Module Study guides on ClickUP for detail.

The University of Pretoria reserves the right to change programmes, modules, domains and credits without prior notice. However, once a student has registered for a specific programme and paid the required fees, a **learning agreement** is established which both parties (the UP and the student) must adhere to. Required changes will be negotiated in advance.

11.3 Programme Architecture

MTIM comprises **12 modules and a research project**. The student earns **10 credits** for **each module** successfully completed, and **60 credits** are earned for the **research project**. The research project must be relevant and is undertaken under the guidance of an adviser. Students with an **Engineering degree** register for the research project using **IGB898**. Students with a **BSc Honours or BTech plus Honours degree** register for the research project using **ISC898**. A candidate qualifies for the appropriate qualification after obtaining 256 credits.

The programme design (list of courses and domains, etc.) is available to students on the **GSTM Student Resources web page**

12. PROGRAMME SCHEDULE

The **Programme Schedule** is available to students on the **GSTM Student Resources web page**.

Carefully diarise orientation day, study blocks, personal development programme, assignments and examinations etc. well in advance. If you have any uncertainty regarding schedules, do not hesitate to contact the Programme Office or specific lecturer.

The *programme schedule* is *carefully designed for the two planned years of study*. Every effort has been put in to ensure a correct, meaningful and *executable* schedule. However, if students start to fail and consequently repeating modules, the *onus is on the student* to make sure that there are *no clashes* the next year in terms of his specific requirement regarding *study block attendance* and *examinations*. Special exams are not arranged to cater for clashes as explained above.

The bottom line is: *Do not register for a module that in any way clashes with another one*. The *priority* is to *complete first year modules first*. The Programme schedule is typically available 9-12 months before any scheduled event will take place. Thus you can plan properly and prevent any surprise.

13. DESCRIPTION OF MEM and MPM MODULES

A Short description of all modules are provided in the subsequent paragraphs. The modules are listed in alphabetical order, fist MEM/MPM modules followed by the MTIM modules.

Refer also to paragraph 7.12 for clarity on “pre-requisite modules”.

MEM/MPM

Construction Management

KBS 803

The Project and Construction Management Professions Act (Act 48 of 2000) defines Construction Management and Construction Project Management as follows:

Construction Project Management is the management of projects within the built environment from conception to completion, including management of related professional services. The Construction Project Manager is the one point of responsibility in this regard.

Construction Management is the management of the *physical construction process* within the built environment and includes the co-ordination, administration, and management of resources. The Construction Manager is the one point of responsibility in this regard.

Although the name of the module only refers to construction management the focus of this module will however be much broader. This module provides an overview of the construction industry. Organisational and environmental challenges are addressed. Unique characteristics of the industry are highlighted. A lifecycle perspective of construction projects and assets is developed. An overview of the global construction economy is provided.

Refer also to paragraph 7.12 for clarity on “pre-requisite modules”.

Engineering Asset Management

IAM 801

"Asset Management" may be defined as a life cycle process for creating, establishing, maintaining, operating, rehabilitating and divesting an asset in an optimal or balanced manner to satisfy the constraints imposed by economy, ergonomics, technical integrity and business performance. Within this definition, physical assets include equipment, infrastructure, people and plant. The 'holistic' view implied here recognises the wider range of disciplines required for strategic decisions and tactical management of physical assets. Strategy and tactics depend on the asset, whereas people processes underpin the effective management of an asset.

The overall objective for the physical Asset Management module is to provide an integrated understanding of the complimentary disciplines applicable to the management of engineered assets. The module will emphasise the synergy between specialist and cross-disciplinary skills and their respective roles with respect to the management of physical assets. The overall outcome for the learner will be awareness of the collaboration required and application of cross-disciplinary skills in technical, engineering, finance logistics, human communication, and other functions to achieve effective management of physical assets.

Decision Analysis and Risk Management IRI 801

Risk can be defined as "the presence of adverse events or conditions that can threaten the survival of the system, or prevent the objectives of the system to be achieved". All systems, natural and human-made, are exposed to risk and this risk should be managed in a responsible way by any business enterprise. The risk exposure of modern organisations is increasing due to complex technical systems, resource structures, processes and interactions. The risk management process involves establishing the goals and objectives for the organisation or functional unit, identifying the risks, quantifying and prioritising the risks, developing responses to the high priority risks, and monitoring the operations. Business enterprises in the manufacturing and service industries have a number of functional areas and processes that are interlinked. Risk management is therefore applied in development of new products or services, operations, maintenance, projects, safety and security.

Engineering Logistics IIX 801

The objective is to introduce the student to the fundamental concepts of the engineering of logistics (i.e. logistic system design). This is done from the perspective of the developer of the system. A broad view of logistics is taken by introducing a model for integrated logistic support to be able to view the engineering of logistics within the right perspective.

This module has been designed to (1) provide the student with a framework, fundamental knowledge and basic skills related to logistics engineering; (2) prepare the student to fulfil his/her logistics engineering roles and responsibilities as a team member of a system development project. This is done by introducing the concept of integrated logistic support with all its associated technical and management disciplines; investigating the goal, objectives and processes of logistics engineering; how to establish an operations and support concept; how the logistic support analysis process can aid in design influencing and the establishment of detailed logistic requirements; how to manage the logistics development process; and finally an introduction to the technologies associated with specifying, designing and producing the logistic support elements.

Financial Management FBS 830

The module objective is to provide the student with a thorough understanding and knowledge about the role and functioning of financial management in order to achieve the objective of the firm. The module is student centred. Consequently students should continuously strive towards a high level of self-activity. Study-units should be studied by students beforehand. During class discussions the emphasis will fall on problems and obscurities, which may arise from the study

material. The syllabus of the module comprises the following: Understanding corporate annual financial reports. Financial statement analysis. The time value of money. Risk and rates of return. Valuation. Capital investment decisions. The required rate of return and long-term financing. Capital structure decisions. Long-term financing instruments. Short-term financing instruments. Current asset management.

Information Management ILB 884

"Information systems are at the heart of virtually every business interaction, process, and decision, especially when one considers the vast penetration of the Web in the last few years. Managers do not have the luxury of abdicating participation in information system decisions. Managers who choose to do so risk limiting their future business options. In essence, managers who let someone else make decisions about their information systems are letting someone else make decisions about the very foundation of their business. This is a module about managing and using information, presented for current and future managers as a way of introducing the broader implications of the impact of Information systems. Attention will be given to IT in very broad terms, including traditional data processing and management information systems, as well as enterprise resource planning systems, electronic commerce data resource warehousing and data mining, managerial support systems, groupware, artificial intelligence applications, and so forth."

Introduction to Project Management IPM 801

This module forms the basis for many (if not all) of the MPM modules that follow. As the name of the module indicates, it is designed to give the MPM student an introduction of some basic concepts. One aspect of great importance in project management is to manage projects in a way that would ensure that the project would be finished on time (either completed by a predetermined due date or, alternatively, completed as soon as possible). In addition to reviewing the basic concepts of project management, *project time management* is therefore covered in depth in this module.

Legal Aspects of Project Management ILC 803

The objective of this module is to present the basic principles of the law with which the project manager has to deal with during the planning and execution of a project. An introduction is presented on the sources of law, the structure of the South African legal system, legal representatives and the right of persons. The general law of contract is done in great detail with special reference to clauses used in contracts, as well as to different types of contracts. Practical examples are given to enable the student to understand how the law is applied in practice. Special attention is then given to the law of purchase and sale and to construction/engineering law (letting and hiring of work). Other relevant aspects discussed in less detail are representation (agency), credit agreement law (lease agreements), as well as the relevant aspects of labour law and alternative dispute resolution.

Literature Study ILS 801

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake a detailed and comprehensive literature review. This course is an integral part of the

Research Process and will be aligned with the Research Proposal of the student. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading and individual assignments.

Maintenance Management

IIB 801

The objective of this module is to obtain the required theoretical knowledge of maintenance management and apply the principles and methodology in practice, with an emphasis on the tools, techniques, procedures and processes to manage the maintenance function within any business enterprise. The module comprises the following themes:

Introduction to Maintenance Management, Maintenance Planning, Organisation of Maintenance Resources, Leading in the Maintenance Environment, Control of the Maintenance Function, Reliability, Maintainability and Availability, Maintenance Approaches and Strategies

Marketing Management

IIM 801

This module will primarily address marketing in the industrial environment, not commercial environment. It is based on the principles of business to business marketing (**B2B**) as well as services marketing. The primary objective of this module is to provide students from a technology or engineering background with a thorough foundation of basic marketing principles and how it can be applied in practice. The areas of market segmentation, macro and micro market environment, developing a value proposition, and understanding buyer behaviour will be explained. Services marketing will include: service development and design, pricing aspects, how services are delivered, how to manage employees and customers in service delivery, managing demand and supply, marketing communication aspects, building customer relationships and loyalty, and how to recover service failures.

New Ventures and Entrepreneurship

IOE 801

This subject aims to provide a wider understanding of the concepts and importance of entrepreneurship and the requirements and processes in commercialising technology-based ventures.

The themes include methodology in screening opportunities and understanding the commercialization process; compiling Technology Entrepreneurship Strategies, Product Development Process & Business Model development; understanding and protecting Intellectual Property, funding options for Entrepreneurial Ventures and understanding the scope and content of a Business Plan.

People Management

PEM 883

The aim of this module is to equip engineering managers to understand the human challenges within the engineering environment and manage these with the aim of optimal performance. The module draws on insights from organisational behaviour and human resource management to prepare engineering managers on three levels. Firstly, managing people through effective recruitment, selection and placement as well as managing diversity, motivation, performance, training, careers and labour relations. Secondly, managing relationships between people by

considering team development and group dynamics. Thirdly, equipping engineering managers to deal with organisational processes by considering conflict management and negotiations, stress management, leadership, organisational communication, change management and organisational culture.

Production and Operations Management IPP 801

This module presents an integrated perspective on the central role of production and operations (manufacturing and services) within industrial enterprises and covers the spectrum of systems, products and services. Firstly, the module deals with the role of the production and operations function in the enterprise and its interaction with the other functions in the organisation, emphasising aspects like customer requirements, competitiveness and measurements. An overview of the different types of production/operations processes is also provided. Secondly, the basic elements within the POM environment are covered in detail and include the aspects of quality in production/operations, master planning consisting of demand management, production and capacity planning and the master production schedule, purchasing, scheduling and inventory reduction. TOC with its foundation as a continuous improvement management approach is central to the module. The aim is to supply the student with background knowledge to understand the principles of production and operations management.

Project Financial and Cost Management IPF 802

The first part (*financial management*) of the module focuses on: Understanding corporate annual financial reports. Financial statement analysis. The time value of money. Risk and rates of return. Valuation. Capital investment decisions. The required rate of return and long-term financing. Capital structure decisions. Long-term financing instruments. Short-term financing instruments. Current asset management.

The second part of the module addresses only some aspects *project cost management*. The management of project costs is of critical importance. This aspect of management can materially influence the ultimate success or failure of a project. In this module, students are introduced to the concepts, ideas and methods used in cost determination and management. Upon studying this module, the student should understand what accountants do, to the extent that he/she should be familiar with the alternative methods available and the limitations of the various methods. This will allow the student to interact meaningfully with the accounting members of a team without necessarily accepting the accountant's answer as sacrosanct. The module covers topics such as: Cost determination, Activity-based costing, relevant costing and Project pricing considerations.

Project Human Resource Management IHR 801

This subject addresses the critical success factors in projects pertaining to people and human resource systems and processes applied in a project environment. This module is divided into four study units:

- **Overview of Organisational Behaviour, and Human Resource Management:** related macro-trends impacting on the project environment.
- **Managing People in Projects:** Understanding who the key stakeholders are and how to manage and lead them to positively contribute towards project performance, e.g. understanding individual performance, managing people diversities and building effective project work relationships. Human Resource systems and processes applied to projects, e.g.

staff acquisition, motivation and job satisfaction, performance management, labour relations and sustainable people development.

- **Project team work:** Team development and group dynamics.
- **Organisational processes impacting on project success:** organisational design/matrix structure, leadership in projects, conflict management and negotiations with stakeholders, power and politics in the project environment, managing a project as a change process and stress management.

Project Management IPK 803

The nature of projects and project management. The project life cycle and project phases. Organisational aspects of project management. Project teams and roles. Responsibility matrixes. Processes and methodologies for planning and control: Initiating the project, Scope planning, Scope definition and the WBS, Scope verification and work authorisation. Scheduling: Stochastic PERT, CPM time-cost tradeoffs and critical chain. Resource planning and scheduling of multiple projects and scheduling of multiple projects. Cost estimating, project budgeting and project cash flow. The control process. Performance analysis: earned value and performance indices. Project closure: evaluation, reporting and termination. Project management information systems. Project closure and continuing improvement. Reasons for project successes and failures.

Project Management Practice IMP 801

This module aims to address the final knowledge area, namely Integration. The objectives of the module are to:

- Identify, develop and motivate a Project Business Case,
- Develop an integrated Project Plan that will be used as reference for project implementation.

Learners will need to utilise all the knowledge and skill obtained during the MPM modules, source additional information and apply to a practical project.

Project Procurement Management IPJ 801

On all projects a significant amount of work is contracted to other organisations, and the rest is contracted internally. Procurement, the study of everything to do with contracting, is thus a vital part of project management. This module will cover the processes involved with procurement, specifically Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Management and Contract Close-out. It includes issues such as the various contracting models; the methods of entering into a contract; the types of contract; incentive contracts; contractual risk transfer, risk management and risk enforcement; and source selection techniques based on the analytic hierarchy process. A special focus will be on build-own-operate-transfer contracts in the form of public-private partnerships, as an example of a sophisticated procurement process.

Project Quality Management IQM 801

The objective of this module is to create awareness of quality as an integrating tool, rather than a subset of project management, and to develop participant's skills to improve their overall ability in delivering better quality projects. Topics to be covered include project quality management in context, quality during project planning, project quality management during design and development, tools and techniques, quality systems (ISO 9001, 10006) and case studies.

Project Risk Management

IRM 801

The objective of this module is to obtain the required theoretical knowledge of project risk management and to apply the methodology in practice, with an emphasis on the tools, techniques, procedures and processes to manage risks within any project. The module comprises the following themes:

Introduction to Project Risk Management, Risk management standards and approaches, Probability and distributions, Risk management planning, Identification of risks, Risk analysis and evaluation, Risk resolution and treatment, Risk monitoring and control, Tools and techniques for risk management, Overall project risk, Cost and schedule risk simulation

Project System Engineering

ISE 802

The module is similar to System Engineering and Management ISE 801, because the objective is also to provide *context* for MPM and to better understand the technology-based enterprise. The objective is to *conceptualise* a tech-based enterprise in terms of processes and interaction amongst processes. These are essential to you as a developing engineering manager and project manager to be successful in your studies and application in the work environment. The *system life cycle*, phases and related processes are focussed upon. High-level process modelling and design are also touched on. The *information management challenge* and processes in the enterprise are analysed and related to business processes. Certain aspects of logistics, configuration management and organisational design are studied. The focus is on Project management activities within the SE process. The important and integrating role of the Project Manager to make SE successful is addressed.

Quality Management

IKK 801

The objective of this module is to create the ability to initiate and manage the implementation of Total Quality Management (TQM) in an organization. Concepts and definitions of quality. Framework for TQM. Design as a key process in ensuring customer satisfaction. The process approach to planning for quality. The role and relevance of quality management systems such as ISO 9000. Use of excellence models such as the South African Excellence Model for self-assessment and benchmarking. Measurement of quality. Tools and techniques for quality improvement. Quality as a process at senior level in an organization. The roles of teams in implementing TQM. Importance of communications and training in implementing TQM.

Research Methodology

INI 800

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake independent research for a masters' dissertation. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures.

The self-study includes prescribed reading, individual assignments and preparation for the examination. The lecturer will act as a guide to the students to acquire the necessary knowledge and skills through self-study and practical exercises, in addition to formal lectures.

Research Project

MEng: IGB 898 done during second year.

MSc: ISC 898 done during second year.

A research project on a topic of the student's choice from any of the modules offered by the Graduate School of Technology Management is done. The work takes place under the supervision of a study leader (project adviser). In addition to the satisfactory completion of the report itself, the student also has to prepare an article and present a paper based on the project at a final year symposium held during November each year. Evaluation is based on report content, article, as well as the presentation. A follow-up symposium is also held during May in the next year.

Strategic Management

ISM 801

The objective with this module is to stimulate strategic thinking and the development of strategic decision making skills amongst students in the field of strategic management in an engineering environment. In this module the following topics are addressed:

Concepts and Practice of Strategy: An historical background serves as introduction. Classical concepts and misconceptions in strategic and operational management work are given.

The Process of Strategic Management: The work content and structure of strategic management are discussed. A schematic model of the process is developed.

Formulation of Strategy: This section gives a statement of the work to be done in formulation of strategy. The following aspects are covered: The company mission. External environment. Environmental forecasting. The company SWOT analysis. Formulating objectives and grand strategies. Strategic analysis and choice.

Implementation of Strategy: In the concluding part of the module attention is given to implementation through business functions, structure, leadership and culture, rewards, control mechanisms for measuring, evaluating and corrective actions.

Strategic Project Management

ISM 804

The conducting of projects is the means for achieving strategic objectives as well as the way that many organisations realise value. Only the right projects should consume the limited money and human resources available to maximize Organizational Effectiveness and Efficiency. This module deals with the holistic system that enables organisations to successfully navigate from strategy definition to delivery of the value expected from the strategy. It includes the processes, the management systems necessary to achieve system effectiveness as well as a number of tools that can be used at the various steps in the processes.

System Engineering and Management

ISE 801

This module provides *context for the MEM Programme*, i.e. how the other modules will interact to form an integrated whole. The system engineering process and management activities are addressed within the *context of the technology-based enterprise*. The objective is to *conceptualise* a tech-based enterprise in terms of processes and interaction amongst processes.

These are essential to you as a developing engineering manager and project manager to be successful in your studies and application in the work environment. The *system life cycle*, phases and related processes are focussed upon. High-level process modelling and design are also touched on. The *information management challenge* and processes in the enterprise are analysed and related to business processes. Certain aspects of logistics, configuration management and organisational design are studied.

Technology Management ITB 801

This subject aims to provide the student with insight into the concept of technology and the utilization thereof in the business environment to achieve the strategic goals of the enterprise. The module in technology management provides theory and application skills, mainly at the operational level. Themes addressed are: Technological evolution, Technology and competitiveness, Linking technology to business strategy. Theory of technology, Technology forecasting, Introduction to intellectual property, Technology audits and acquisition strategies, Introduction to the national context.

14. DESCRIPTION OF MTIM MODULES

Decision Analysis (IBD 880)

Techno-economics analysis (TEA), also referred to as economic feasibility studies, is a core technique which is used to support decision making in all for-profit organisations and sometimes more broadly in the public sector. The fundamental principle of the analysis is that only investments or projects which show a positive return on investment should be approved and implemented. Although stated simply, this principle is complex to apply since it changes according to the manner in which costs and income are accounted or measured. The simplest approaches use the generic models of net present values, discounted cash flows, internal rates of return and the time value of money to compare expenses against earnings. In this module, the student will be given an introduction to the principles of techno-economics and the structure of TEA. This introduction will be followed by material on the core calculations of TEA, including present value, future value and return. The students will be required to apply the initial TEA structure to a class project in order to acquire the basic knowledge with which such an analysis can be completed, and as a consequence, how to guide decisions relating to investment in future projects.

Financial Management (FBS 831)

"The goal of a firm is to maximise the long-term wealth of its shareholders." Why do most management experts generally accept this statement? How do all the other objectives of a firm relate to this goal? Why is the success of most companies measured in financial terms? In FBS831 answers to these questions are sought. The nature of and interaction between different financial statements are investigated, as well as their role in the creation of shareholder wealth. Although maximizing shareholder wealth is the basic general cornerstone of management, recent developments point out that non-quantitative factors are also important in the measurement of company performance.

Human Resources (PEM 884)

While the cliché "Our company's most important asset is our people" is often used, the aim of the PEM 884 module is to bring life to this statement, equipping managers in the technology environment to manage people in a way that enhances both their value and humanity. The course centres around challenges in the technology environment for the 21st century, considering how

organizational behaviour and human resource management processes can be used in mastering these. The course includes aspects such as managing individuals, teams and organisations with regard to various dimensions of behaviour including: individual diversity, emotional intelligence, motivation and team performance, group dynamics in managing teams, communication, leadership, power and politics, organisational culture, organisational change and stress, labour relations and human resource processes.

Literature Study (ILS 801)

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake a detailed and comprehensive literature review. This course is an integral part of the Research Project and will be aligned with the Research Proposal of the student. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading and individual assignments.

Mini-dissertation (ISC/IGB898)

The research project is the capstone of the MTM programme. It comprises an independent research study into an area of engineering, project or technology management, applying the principles learned during the programme. Although not a full Masters dissertation, it is essential to produce something original and useful, both to an academic field in the respective programmes and to the public/private sector that searches for solutions. Although this is a research project of limited breadth and scope, it nonetheless has to comply with the requirements of scientific research.

Organisation and Innovation (INV 880)

The Master module Organisation and Innovation has been designed for Master students wishing to build substantive and methodological knowledge in two profound and related disciplines and phenomena: organisation studies and innovation studies. It focuses on providing an overview of the main concepts, theoretical perspectives and models regarding organisation, technological innovation and the relationships between different forms of organisation and technological innovation (e.g. organizing for creativity; systems supporting innovation). This module further explains innovation at several levels of analysis (individuals, teams, organisations, sectors, nations). Students are expected to apply the acquired knowledge in their workplace.

New Product Development (INP 880)

The development of new products is a very important activity within a firm. There is always a high risk of failure but the best companies manage to bring out successful new products on a continuous basis. The module introduces the processes, tools and techniques and strategies used by leading-edge companies for new-product development. It examines different stages of product development, from idea generation to market testing and includes the assessment and selection of appropriate business models. Fourth industrial revolution technologies are considered as well.

Project Management (IPK 804)

This module addresses basic project management concepts, principles and techniques. The module is aligned with both the U.S. Project Management Institute's Project Management Body of Knowledge (PMBOK) as well as PRINCE2 methodology developed in the UK. Scheduling of projects is a core element of project management and IPK780 covers project scheduling in somewhat more detail and at a more advanced level than the other topics.

The aim of the module is to develop the learner's ability to identify and solve problems in a way that display critical thinking and the application of quantitative methods. The module focuses on

project initiation, planning, monitoring and control. Specifically the development of a project plan, different scheduling techniques, earned value, decision making and basic risk management. A deliverable of the module is a project plan (including project scope, WBS, schedule, risk management plan and cash flow) for a project in the learner's work environment.

Research Methodology (INI 800)

The overall objective of this module is to provide students with sufficient knowledge and skills to undertake independent research for a masters' dissertation. The major part of the course consists of individual self-study done by the student outside the classroom in his/her own time, complemented by student-centred and co-operative learning/teaching methods during lectures. The self-study includes prescribed reading, individual assignments and preparation for the examination. The lecturer will act as a guide to the students to acquire the necessary knowledge and skills through self-study and practical exercises, in addition to formal lectures.

Science, Technology and Innovation Policy (ISP 880)

Science, Technology & Innovation (STI) Policy is considered to drive innovation and innovation is considered to be a core contributor to economic growth in all countries. As a result, STI policy is critical to the effective generation and utilisation of STI knowledge, whether this be undertaken for public good or private gain. In this module the student will be given an introduction to, and the linkage between, Science and Technology, research and development, and innovation. This introduction will be followed by a brief history of innovation theory and how S&T links to both national and technological innovation systems. The range of policy instruments which can be used to stimulate science, technology and innovation will then be reviewed, followed by the characterisation of the instruments which are presently adopted in South Africa. The student will then be presented with a range of frameworks to allow the analysis of different S&T policies and innovation systems, with particular reference to South Africa and other countries in the region.

Strategic Technology & Innovation Management (IST 880)

The objective of this module is to provide students with the necessary skills to develop technology and innovation strategies for organisations. Themes include the concepts of technology and innovation strategy, processes of strategic management, formulation of technology and innovation strategies, strategy implementation, technology roadmapping, scenario development and future thinking. Appropriate case studies are used to link the theory and practice.

Technological Intrapreneurship (IEE 880)

Technological Intrapreneurship or Corporate Entrepreneurship (CE) refers to the means by which an organisation revitalises itself and alter its competitive contour through embarking in entrepreneurial activities which focus on innovation. CE is one of the key tools to take organisations forward in an environment faced by global challenges. This module focuses on the fundamentals of CE, how to design an entrepreneurial organisation, building cultures to support technological intrapreneurship and enable continuous intrapreneurial performance within a corporation.

Technology Commercialisation (IKG 881)

(Only students who have completed Project Management - IPK 780)

The survival of modern companies increasingly depends on the development and successful commercialisation of new products and services. The module is designed to address the principles embedded in the process of identifying, transferring and commercialising inventions and knowledge within the context of national systems of innovation. The intention is to integrate

the functional elements of innovation management with emphasis on the entrepreneurial process of commercialising new methods, practices, processes, products, services, systems and technology towards the generation of economic growth, wealth and prosperity.

Technology Management (ITB 802)

The module aims to provide students with insight into the concept of technology and the utilisation thereof in the business environment. The module provides theory and application skills on the operational level. Themes addressed are: Theory of technology, Technology forecasting and dynamics, Technology audits, Technology planning and Technology acquisition. The themes form part of the portfolio of technology management activities that organisations should be able to master in order to be competitive.

15. GENERAL INFORMATION

15.1. Location of Offices

The programme offices are in the GSTM, situated on the western side of campus (Engineering Building 2, second floor).

15.2. Lecture and Syndicate Rooms

Most lectures take place at the *Graduate Centre* (eastern side of campus), or in close proximity thereof. *Lecture rooms will be clearly indicated at the start of the study block.* Syndicate rooms will be allocated as and when required.

15.3. Parking and Property

Please take note that parking is at your own risk. Likewise, any property that you bring with you and leave in class is also at your own risk. Unfortunately there have been *some thefts in the past* and you are therefore advised not to leave any valuables (especially *mobile phones* and *notebook* computers) unattended.

15.4. Cell Phones and Messages

All cell phones must be switched off in class and no calls may be taken. Except in extreme emergencies (medical, accident, death,...), no messages will be taken at our offices. If such an event occurs, we will do our best to contact you. Unfortunately, the telephones and fax machine at our offices cannot be made available for your personal or official use. In general, it is important to free yourself from your office and your place of employment during the study block periods. Please request your colleagues and superiors to respect this. You will need all the time to focus on your studies.

15.5. Personal information

Please keep the *Programme Administrator informed* of any changes of personal information, specifically e-mail addresses and telephone numbers. This is essential for communication and registration purposes.

15.6. University and Faculty Regulations

In addition to information contained in this document there are also University and Faculty Regulations of which you should also be aware. It is important that you familiarize yourself with these regulations. Copies are available from Faculty Administration.

15.7. Alumni Affairs

The GSTM considers our Alumni as key role-players regarding continuous education, programme development as well as potential partners in business endeavours and research. We have a dedicated person coordinating alumni affairs. More detail will be provided during the course of the programmes.